

Comments on 903 Pad, Mound and East Trenches Areas  
Draft Phase II RI/FS Workplan

Cover Page As agreed through negotiation of the Interagency Agreement, this should be titled Draft Phase II RFI/RI Workplan (Alluvial)

Executive Summary A separate Draft Phase II RFI/RI Workplan will be presented describing the plans for a bedrock investigation

Barium, calcium, sodium, magnesium and copper also appear to be frequently above estimated background levels in unconfined groundwater affected by OU 2. Gross alpha and gross beta are also potentially above estimated background in unconfined groundwater affected by OU 2. Gross alpha and Cs 137 may also be elevated in surficial soils affected by OU 2. Conclusions about surficial soils should be tempered as the borehole composite intervals at OU 2 are generally large (0 - 10 feet) and may not represent the actual concentrations of the surficial soils.

All statements in the Executive Summary offering conclusions pertaining to whether contaminants are present above background should be predicated with a discussion of the preliminary nature of the background data gathered to date. The Executive Summary should also inform the reader that only first quarter 1988 data are compared to the background data in drawing these conclusions.

Section 1.1 The draft Proposed IM/IRA for OU 2 was designed to address contaminated bedrock wells. Only one of the wells to be pumped is defined as an alluvial well. This Interim Measure/Interim Remedial Action has not been approved by EPA or the State.

If this Workplan is based on results of the Phase I RFI/RI and subsequent groundwater sampling and analysis, all of this data should be presented, not just the first quarter 1988 data. In subsequent reports and workplans, DOE should present all data, not just data where greater than an estimated background limit.

Section 1.3.1 This section should address the operation of the plant by EG&G, beginning January 1, 1990.

Section 1.4.1.1 Which burial grounds were utilized for shipment to and disposal of the drums containing the radioactive sludge found in the bottom of all drums after removal of the oil? Why would incompletely filled drums be shipped to the 903 storage area? What information did Freiberg (1970) utilize to base his estimate of total oil leaked?

Section 1.4.1 2. What basis does DOE have for making the statement that 1976 soil removal techniques did not result in any personnel exposures or environmental impacts? If the hand excavation effort beginning in June, 1976 removed soils to FIDLER background (250 cpm), why were there still contaminated soils above 2000 cpm which were subsequently removed in June, 1978?

Section 1.4 1 4 Were the unknown quantities of sodium, calcium, magnesium disposed of at this location, not destroyed?

Section 1.4.2.1. How were the drums disposed at the site? What is meant by the "drums were placed at the Mound Site"? Were the drums buried at the Mound Site or stored on the surface? What condition were the drums in when the drums were excavated from the Mound Site? Cleanup of the Mound Site may not have been accomplished. It is difficult to conclude that the radioactive contamination is the result of wind dispersion of radionuclides from the 903 Pad when borehole composites do not actually sample the top surface of the soils

Section 1.4.2.2. 25,000 kilograms is equivalent to approximately 55,000 pounds, not 11,364 pounds.

Section 1.4 3. As agreed in the Interagency Agreement, SWMUs 216 2 and 216.3 were to be included as units within OU 4. Agreement must be reached between the EPA, CDH and DOE on how these units will be investigated

Section 2.2.2 1. It is also useful in planning remedial investigations to present the maximum groundwater flow velocities for the alluvial systems, especially in light of the possibility of a paleochannel in the area of well 42-86

Section 2 2.2.2 The workplan should present the preliminary information gathered from the seismic studies profiling the Arapahoe formation. This information might prove invaluable in determining locations for bedrock and alluvial wells.

Section 2.3 1 DOE should review the comments submitted by EPA concerning the Background Geochemical Characterization Report. The presentation of maximum detected values is not in accordance with the Background Hydrogeochemical Characterization and Monitoring Plan. It is at least a possibility that maximum detected values could be outliers. DOE did not present the results of outlier tests on these values to eliminate this possibility.

The tolerance interval limits presented for background surface water should not include information gathered from

stations SW-104 and SW-80

Section 2 3 2 Given the large composite intervals sampled during the phase I investigation, it is premature to make conclusions concerning the soil contamination associated with this OU. No Uranium 235 data is presented so that conclusions concerning the presence of this radionuclide cannot be made. Lithium concentrations in soils are not presented. This is especially important for SWMU 140.

It cannot presently be stated that other radionuclides and trace metals do not appear to be contaminants at this OU. Soils potentially affected by the 903 Pad appear to contain elevated levels of cadmium, barium, manganese, mercury, arsenic, calcium, uranium 233 and cesium 137. Soils potentially affected by the Mound Area appear to contain elevated levels of aluminum, calcium, iron, selenium, vanadium, cadmium, arsenic, barium, manganese, tritium, uranium 238 and cesium 137. Soils potentially affected by the activities at the East Trenches Areas appear to contain elevated arsenic, cadmium, manganese, zinc, calcium, lead, sodium, vanadium and tritium. These statements are made with respect to the tolerance intervals or maximum detected levels for each constituent as presented in the background study report.

Please explain what organic plutonium contamination is.

The handling of radionuclide data is awkward. Should a measured value with an associated error term be compared to a tolerance interval? What propagated error is associated with the tolerance interval? Is it valid to compare measured values with an associated error term to a tolerance interval without an associated error term? Field blanks also show measured values and associated error terms. Are field blank measurements also the result of the statistical process? Enough field blanks must be collected to calculate a tolerance interval for field blanks. Should this number then be subtracted from the measured value? Is this accounted for entirely in subtraction of background radiation? Don't the field blank analyses also have to account for background radiation, or is the field blank measurement a measurement of background radiation?

If the radionuclide value is greater than the upper tolerance limit (not the background measured value plus the error term) for the background determination, then the measured value can be considered statistically different from background, if the background study plan procedures are followed.

Table 2-6 "surface samples" may actually be composites

ranging up to 12 feet in depth. Conclusions concerning the localization of plutonium on "the surface" is at this time premature. Although the wind dispersion of radionuclides from the 903 Pad is a likely contributor, given the shallow burial disposal practices, the composite results attributed to surface soils may be partially attributable to contamination of the soil column within the composite. Therefore the non-localization of Uranium, cesium and strontium may not be indicative of variations in background. The frequency of these findings may also be due to poor characterization of the OU. The fact that some of the radionuclides may be within twice the upper tolerance interval limit is irrelevant in light of the results of the background study. Until more substantial evidence is generated to fully characterize the site and more information is gathered to solidify the tolerance intervals for background, no conclusions should be drawn.

It is unclear what relevance frequency of exceedance of the upper tolerance limit has for metals analyzed at OU 2. In many cases the background report cannot present upper tolerance limits, but instead presents maximum detected levels which have not been shown to be within the background distribution. No outlier determinations have been made. The characterization of the sources is presently inadequate and as such no information about metal levels within each source has been presented. Also no information has been presented regarding the effect the disposal practices have had on the naturally existing metals within the soils (i.e. dissolution, leaching, complexation, adsorption, precipitation, ionic exchange). There is certainly the possibility that the disposal activity has affected the soils. There are also many more metals above the upper tolerance intervals or maximum detected levels than those presented in this section. Many of the soil sample metals levels exceed twice the tolerance interval. It is unclear how a 30% frequency of cadmium exceeding the upper tolerance limit or maximum detected level can be considered infrequent.

Section 2.3.2.1 Generally, the quality of the volatile organic analyses do not allow statements to be made concluding that volatile organics are not present within the 903 Pad Area. Medium contaminant levels were apparently expected and the CLP procedures appear to have been adjusted to reflect this. The phase II investigation must not utilize medium CLP detection levels, but must utilize the lowest limit of detection to verify or refute the analyses presented in the phase I report. The workplan must acknowledge the validation work being performed for all of the OU 2 data. If the analytical data cannot be accepted, this will impact the amount of work to be performed for phase II at all sites.

within OU 2 The phase I data summarization should present which boreholes are being used to define the characteristics of each SWMU

The quality of the volatile organic analyses do not allow statements to be made concluding that volatile organics are not present within the 903 Lip Site soils (SWMU 155)

Trench T-2 (SWMU 109) soils also appear to be contaminated with acetone, 2-butanone, chloroform, 4-methyl-2-pentanone, toluene, ethylbenzene and xylenes

The quality of the volatile organic analyses data does not allow statements to be made excluding the presence of the volatiles methylene chloride, trans-1,2-dichloroethene, chloroform, trichloroethene, and cis-1,3-dichlorpropene It appears that phthalates are also present at this site

Section 2 3 2 2 Generally, the quality of the volatile organic analyses do not allow statements to be made concluding that volatile organics are not present within the Mound Area Medium contaminant levels apparently were expected and the CLP procedures appear to have been adjusted to reflect this The phase II investigation must not utilize medium CLP detection levels, but must utilize the lowest limit of detection to verify or refute the analyses presented in the phase I report

Phthalates, PCBs and possibly methylene chloride and acetone appear to be present in soils at the Mound Site (SWMU 113) More borehole samples must be analyzed to determine the presence or non-presence of organic contamination at the Mound Site

It is unclear which boreholes are being used to characterize the Oil Burn Pit and Trench T-1 Sites No boreholes are placed to adequately characterize SWMU 153 The fact that volatiles are found at estimated values below detection limits is more a function of utilization of the wrong CLP 8240 procedure rather than that the volatiles are not present Both surficial soils and below surface soils must be analyzed for plutonium and americium to confirm the hypothesis regarding wind dispersion of these radionuclides from the 903 Pad site

Methylene chloride, bis(2-ethylhexyl)phthalate and aroclor-1254 also appear to be present at the Pallet Burn Site (SWMU 154)

Section 2 3 2 3 Generally, the quality of the volatile organic analyses do not allow statements to be made concluding that volatile organics are not present within the soils at the

East Trenches Area. Medium contaminant levels apparently were expected and the CLP procedures appear to have been adjusted to reflect this. The phase II investigation must not utilize medium CLP detection levels, but must utilize the lowest limit of detection to verify or refute the analyses presented in the phase I report.

It is not acceptable to only analyze the surficial soil samples for radionuclides in an attempt to verify that the radionuclides are limited to surficial soils. It must also be proven that there are not radionuclides below the surface.

Phthalates were also detected in boreholes associated with Trenches T-3, T-4, T-10 and T-11. 2-butanone was also above detection limits in BH43-87.

Methylene chloride, 1,1,1-trichloroethane, toluene, xylenes and phthalates appear to be present in boreholes associated with trenches T-5 through T-9.

Section 2.3.3.1. In reference to Table 2-10, volatile organic compounds in rocky flats alluvial groundwater, chloroform at 21 ppb should not be designated 21J. The 5J finding for 1,1-dichloroethene was found in well 15-87, not well 10-87. Carbon tetrachloride found in well 15-87 should not be designated as 1100J, it is present well above detection limit. Carbon tetrachloride found in well 17-87 should not be designated as 47J, it is present well above detection limit.

In reference to Table 2-10, volatile organics in colluvial groundwater, methylene chloride was identified at 6 ppb in well 29-87

In reference to Table 2-10, volatile organics in valley fill alluvial groundwater, tetrachloroethene in well 64-86 is present at 8 ppb and is above detection limit. The data presented for wells 64-86 and 65-86 do not indicate the presence of acetone and carbon disulfide below detection limits. Were these VOCs present?

In reference to Table 2-10, volatile organics in weathered claystone groundwater, chloroform is present in well 3-74 above detection limit at 11 ppb. Carbon tetrachloride is present in well 1-71 at 690 ppb, well above detection limit

In reference to Table 2-10, volatile organics in weathered sandstone groundwater, methylene chloride is present at 6 ppb in well 14-87. 1,1-dichloroethene is present at 22 ppb in well 36-87, well above the detection limit. Carbon tetrachloride is present in well 14-87 at 160 ppb, well

above detection limit

In addition to CCl<sub>4</sub>, PCE and TCE, chloroform appears to be present in the unconfined groundwater systems at the same locations as where CCl<sub>4</sub> is found. Also, the valley fill alluvial groundwater appears to be contaminated with different VOCs than those found in the other alluvial systems. Why aren't wells 16-87, 18-87, 22-87, 29-87, 30-87, 34-86, and 45-87 data presented in this report?

Section 2 3 3 2 The high concentrations of major ions at well 29-87 may be indicative of the transport of contaminated water by the south interceptor ditch

Calcium, magnesium and sodium also appear to be frequently elevated with respect to background levels

It is important to consider the problems associated with calculation and presentation of a tolerance interval for radionuclides which are not likely to be associated with background groundwater (plutonium and americium) and which appear to approach zero. DOE should refer to the comments made by EPA concerning the background study and proposed radionuclide tolerance intervals. It is also important to note that in some instances specific radionuclide information was not reported. Has the previously collected groundwater data for inorganics, metals and radionuclides been rejected? Information presented in the December 31, 1987, RI Report for OU 2 indicates that specific radionuclides are present above presently defined background levels

Section 2 3 4 DOE must refer to the comments made by EPA concerning the background study so as to reevaluate the background levels for surface water

The Workplan should note that the surface water results for metals, inorganics and radionuclides rely on information from limited sampling (i.e. most of the seeps were dry at the time of the sampling, analytes were not reported, data not yet received)

DOE must sample known seeps at times when it is anticipated that the seeps will be flowing. To sample a seep when it is not flowing provides no information

Section 2 3 5 1 It should be noted in the report that acetone and methylene chloride were found but are suspected laboratory artifacts. It cannot be stated that no volatile organic compounds were present above detection limit in the sediments of the Woman Creek drainage. Chloromethane, chloroform and trichloroethene were found in sediments of

the Woman Creek drainage. In addition, trichloroethene and toluene were present in sediments of the Woman Creek drainage at levels estimated below detection limits

The sediment samples taken in October 1989 may not suffice as confirmatory information regarding the concentrations of VOCs, metals, other inorganics and radionuclides in sediments. DOE must present the sampling locations and results of these analyses to EPA when the information is available to DOE so that EPA can determine the adequacy of this information

Section 2.4. The Phase II RFI/RI Workplan must now revise the ARARs applicable to this Workplan to reflect the newly adopted Colorado Water Quality Standards for tributaries to Standley Lake and Great Western Reservoir

In reference to Table 2-12, RCRA Subpart F standards are relevant and appropriate. 1,1-dichloroethane is a RCRA Appendix VIII constituent listed as ethylidene dichloride. Therefore background for 1,1-dichloroethane is relevant and appropriate. The newly promulgated CDH surface water standard for 1,1,2,2-tetrachloroethane is 170 parts per trillion. This standard for 1,1,2,2-tetrachloroethane is applicable. The newly promulgated applicable CDH surface water standard for trihalomethanes is 190 parts per trillion. Although contaminant concentrations in groundwater were estimated below detection limit, ARARs analyses must be presented for methylene chloride, acetone, carbon disulfide, 1,2-dichloroethene and toluene. The ARARs for radionuclides have been changed as a result of the State of Colorado's adoption of new standards for Woman and Walnut Creeks. These standards for Woman Creek are now;

Gross alpha	7 pCi/l
Gross beta	5 pCi/l
Pu 238,239,240	.05 pCi/l
Am 241	.05 pCi/l
Tritium	500 pCi/l
Uranium	5 pCi/l

These standards for Walnut Creek are now,

Gross alpha	11 pCi/l
Gross beta	19 pCi/l
Pu 238,239,240	.05 pCi/l
Am 241	.05 pCi/l
Tritium	500 pCi/l
Uranium	10 pCi/l

The presentation of chemical specific ARARs must include an analysis of the potential ARARs for the phthalates and PCBs



determined to be present within soils at this OU

Section 2 5 The associated remedial technologies for in-situ contaminated soils treatment should also consider biological treatment and vitrification. What data requirements are needed to evaluate vitrification? Data needed for evaluation of soil bioreclamation, groundwater bioreclamation, above ground bioreclamation, UV peroxide oxidation, air stripping and in-situ aeration would include analysis of the full suite of organic constituents. There is also a need for treatability testing so as to facilitate evaluation of the alternatives in the Feasibility Study.

Section 3 1 General conclusion number 8 must require that further characterization of all sites is warranted regardless of whether previous removal operations have attempted to remove wastes from the disposal sites. It is presently evident that previous efforts were not entirely successful.

The quality of the data resulting from the phase I borehole investigation is poor. The Workplan must consider this fact and require recharacterization of soils adjacent to SWMUs. The data previously collected may be rejected and presently cannot be used to irrefutably substantiate conclusions.

Neither the extent of the organic contamination in the unconfined groundwater nor the characterization of the sources of these groundwater plumes has been determined. The phase I RFI/RI did not characterize the nature or extent of groundwater contamination in either the unconfined groundwater flow systems or the confined groundwater flow systems.

Section 3 2 Given that the soil borehole data quality derived from the phase I investigation is poor, phase II investigation objectives must include recharacterization and verification of previous results defining the nature and extent of soil contamination in soils. This is in addition to the characterization of the surface soils for radionuclides. The phase II investigation must determine whether the soil column is contaminated with organics postulated to be laboratory artifact. DOE must modify this phase II investigation to fill the data gaps left by the poor quality data collected during the phase I investigation.

DOE may wish to accelerate presentation of the Quality Assurance Project Plan and Standard Operating Procedures to EPA. Analytical methods must provide information which allows comparison to ARARs levels. The detection limits for vinyl chloride and trans-1,2-dichloroethene must be lowered.

DOE must consider the newly established water quality standards of the State of Colorado in determining the required detection limits for contaminant analysis. As noted in EPA comments on section 2.4 above, the water quality standards for radionuclides, trihalomethanes and 1,1,2,2-tetrachloroethane must be modified. Table 3-2 must include an analysis of detection limits versus ARARs levels for all constituents as presented in Table 2-12. Detection limits must be modified for all analyses where detection limit is above ARAR standard.

Section 4.1.1. DOE should accelerate presentation of the Quality Assurance Project Plan (QAPP) and Standard Operating Procedures (SOP), or those portions directly pertinent to this workplan, to EPA. DOE must refer to the 1990 versions of the SOP and QAPP once approved by EPA and CDH. If the EPA and CDH approved versions of the SOP and the QAPP alter procedures presently anticipated by this OU 2 phase II Workplan, the work affected by these modifications must be reevaluated, dependent on the degree of the modifications to the SOP and QAPP.

Section 4.1.2. DOE has forwarded a Community Relations Survey Plan to EPA and CDH, not a workplan. The draft Community Survey Plan was not complete in January, 1990.

Section 4.1.3 The Phase II RI/FS field investigation must be designed to meet the objectives outlined in section 3.0, not section 4.0. DOE must propose to drill and sample soils and wastes external to SWMUs in order to verify the results obtained through completion of phase I. The analytical results of phase I soils sampling provide poor data which has lead to unsubstantiated conclusions. Has the phase I data been validated? The answer to this question has significant bearing on the requirements of the phase II investigation

Section 4.1.4. DOE should accelerate submittal of the QA/QC Plan or those portions pertinent to this workplan, for EPA and CDH review and approval. Modifications to this plan required by EPA and CDH may effect changes in the work delineated through this workplan.

Section 4.1.5.3. The analytical results of phase I soils sampling provide poor data which has lead to unsubstantiated conclusions. Has the phase I data been validated? The answer to this question has significant bearing on the requirements of the phase II investigation. DOE must propose to drill and sample soils and wastes external to SWMUs in order to verify the results obtained through completion of phase I.

DOE has agreed to determine the nature and extent of contamination in the uppermost aquifer through this phase II alluvial investigation. This includes characterization of interconnected sandstones and other bedrock formations providing a migratory pathway for transport of contamination. This phase II investigation is not to be limited to only characterizing the alluvial geological systems.

Section 4 1 5 4 Geotechnical data from source boreholes must also be used to evaluate the effectiveness of in-situ vitrification.

Section 4 1 6 1 Rather than deleting contaminants from consideration for risk assessment at OU 2, contaminants of concern should be chosen based upon intrinsic toxicological properties, quantity present within the operable unit, or because the contaminant is presently in or potentially may move into critical exposure pathways. Although the use of indicator chemicals serves to focus and streamline the risk assessment on those chemicals that are likely to be of greatest concern, a final check needs to be made during the remedy selection and remedial action phases to ensure that the waste management strategy implemented addresses risks posed by the entire range of contaminants found at the site.

The final step in the exposure assessment step of the risk assessment is to develop an estimate of the expected exposure levels from the actual or potential release of contaminants from the OU.

DOE must be aware that EPA and CDH continue to update toxicological information and based on these updated data, the ARARs used to compare to projected concentrations of indicator chemicals at exposure points may change. Aside from the comparison to ARARs, DOE should also compare the projected concentrations to proposed drinking water standards provided that the proposed standard is for the same exposure pathway.

Section 4 1 7 It should not be stated that "the mineral jig is the most probable technology for reducing the volume of the contaminated soil at the 903 Pad Area" prior to conducting the tests and determining the acceptability of the technology with respect to the CERCLA evaluation criteria.

Section 4 1 8 The Phase II RFI/RI Report shall also discuss the physical conditions of the bedrock groundwater flow systems which are interconnected with the alluvial groundwater flow systems. This Phase II RFI/RI Report shall discuss the characterization work of the uppermost aquifer as agreed by DOE and completed as a task under this phase of the remedial

investigation.

Section 5.1.1. EPA recommends that DOE submit portions of the Rocky Flats Program SOP directly related to the anticipated field work to be performed for this phase of the remedial investigation of OU 2. This is especially important in light of the potentially dangerous drilling work to be completed.

DOE must reference the letter sent by EPA to DOE on November 30, 1988, to understand EPA's general reasoning and noted deficiencies regarding the originally submitted Phase II Sampling Plan for the 903 Pad, Mound and East Trenches Areas.

DOE must sample all boreholes for complete volatile, semi-volatile, inorganic, metal and radionuclide analyses. Discrete samples must be submitted from each core to represent each two foot interval. This sampling and analysis is required to verify the results of the phase I investigation.

DOE must evaluate the need for well clusters in lieu of screening a single well through varying lithologies. The usefulness of information derived from wells with screened intervals exceeding 10 feet is uncertain. The screened intervals should be predicated on knowledge of the contaminants anticipated ("sinkers and floaters"), the potential migration pathways and lithology encountered during drilling.

DOE must provide boreholes and wells which are designed to characterize the nature and extent of contamination potentially associated with sites 154 and 153. Is the use of directional drilling feasible for this application? If there are logistical/security problems associated with drilling into the perimeter security zone, boreholes and wells must be proposed which can evaluate the extent of contamination from these potential sources (i.e., downgradient drilling inside the perimeter security zone). Another borehole and well should be located approximately 150 feet east of well 49-90.

12-90/BH1990 should be moved north approximately 40 feet to more closely monitor the extent of soil and groundwater contamination downgradient of Trench T-2.

Monitoring wells should be installed adjacent to BH2090 and BH2290 to more thoroughly define the extent of contamination from the 903 Pad. A well should be installed 150 feet south of well 15-87. Wells 48-90 and 49-90 are to be installed north of the Mound Site and north of Oil Burn Pit, if figure

5-1 is correct Well 57-90 should be moved farther west of well 03-74 (approximately 50 feet west of it's present location) to more thoroughly characterize the extent of contamination Although the east spray fields were not anticipated to be investigated as sites within this OU, wells and boreholes should be placed to characterize the nature and extent of contamination within and external to these sites Wells and boreholes should be placed to evaluate the extent of contamination in the surface drainages affected by the east spray fields A well should be placed within the surface drainage approximately 400 feet south of well 83-90 Well 82-90 should be moved approximately 100 feet west to the western side of the origin of the localized drainage off of the plateau

Section 5 1 2 2 As agreed by DOE, the Phase II Alluvial RFI/RI Workplan for OU 2 shall be revised to complete the characterization in two steps The first step will define the extent of contamination including plume definition in surficial materials and in bedrock materials where the bedrock is interconnected with the alluvial groundwater flow system This workplan must be revised to reflect this agreement The second step of the complete remedial investigation for the alluvial system will be to characterize the nature of the sources of the contamination

Well 47-90 should be completed closer to the Western Pallet Burn site than is depicted in figure 5-1

Another monitoring well should be located approximately 150 feet north of proposed well 71-90

Section 5 1 2 3 The sediment samples taken in October 1989 may not suffice as confirmatory information regarding the concentrations of VOCs, metals, other inorganics and radionuclides in sediments DOE must present the sampling locations and results of these analyses to EPA when the information is available to DOE so that EPA can determine the adequacy of this information

Section 5 2 3 DOE must notify and receive approval from EPA and CDH prior to deleting parameters from analysis

Section 5 2 4 Radionuclide analysis must consist of total and dissolved analyses for all radionuclides presented